

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference S30822PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/EP2005/003319	International filing date (<i>day/month/year</i>) 30 March 2005 (30.03.2005)	Priority date (<i>day/month/year</i>) 01 April 2004 (01.04.2004)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant SCHMIDT, Christian		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input checked="" type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 04 October 2006 (04.10.2006) Authorized officer <div style="text-align: center; font-weight: bold;">Ellen Moyse</div> e-mail: pt05@wipo.int
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PATENT COOPERATION TREATY

CORRECTED VERSION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2005/003319

International filing date (day/month/year)
30.03.2005

Priority date (day/month/year)
01.04.2004

International Patent Classification (IPC) or both national classification and IPC
B26F1/28

Applicant
SCHMIDT, Christian

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/EP2005/003319

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search . (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☒ not paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-67

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-50,52-67
	No: Claims	51
Inventive step (IS)	Yes: Claims	1-50,52-67
	No: Claims	51
Industrial applicability (IA)	Yes: Claims	1-67
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/EP2005/003319

The application lacks unity (R. 13 PCT) for the following reasons:

The independent claims of the application are:

Claim 1 - A method of forming a structure in a region of an electrically insulating substrate by causing dielectric breakdown of the substrate and using additional energy to increase the temperature in said region so as to reduce the amplitude of voltage necessary to cause dielectric breakdown and with a feedback regulation of the voltage/current.

Claim 51 - A method of forming a structure in a region of an electrically insulating substrate by causing dielectric breakdown of the substrate using a "small voltage" and **WITHOUT** using additional energy to reduce the amplitude of voltage necessary to cause dielectric breakdown.

Claim 52 - A device for forming a structure in a region of an electrically insulating substrate comprising two electrodes connected to a voltage supply and means to apply energy, to said substrate, such means being one or two electrode or an additional heat source. This device is only optionally suitable for the performance of a method according to a previous method claim.

Claim 53 - Same as claim 52, but without the option of an additional heat source.

Claim 68 - An electrically insulating substrate having a structure or array of structures produced by the method (which is the same in patent practice as a product as obtainable by the method) according to any of claims 1-51.

Claim 73 - Use of a substrate according to one of claims 68-70 or a device incorporating it for certain purposes.

Prior art as described in documents US-4,777,338 [D1] or US-6,348,675 [D2] disclose electrically insulating substrates perforated by spark discharge which are not distinguishable from those which can be produced by the method of claims 1-51 of the application. These substrates are consequently obtainable by the same method. Such a substrate is therefore known.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/EP2005/003319

The remaining features of claims 69-73, distinguishing it from common prior art and more closely defining the substrates, have nothing in common with the claimed methods or the devices; vis-a-vis the prior art disclosed in D1 and D2, solve particular application problems of the substrate whereas claims 1-67 solve manufacturing problems. In the absence of a common problem and different distinguishing features vis-a-vis common prior art (which can be potential special technical features), there is no relationship to be established between the said inventions, which involves a single general inventive concept.

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document/s/:

D1: US-4,777,338

D2: US-6,348,675

Claims 1-50

Document US-4,777,338, which can be regarded as the description of the closest prior art for the subject-matter of claim 1, discloses a method of forming a structure (perforation) in an electrically insulating substrate (synthetic plastic film) comprising the steps of a) providing an electrically insulating substrate, b) applying, by means of a voltage supply (36) a voltage across a region of said electrically insulating substrate, said voltage being sufficient to give rise to a significant increase in electrical current through said region and to dielectric breakdown thorough said region, and c) applying energy (heat, the film is submerged in hot water, see column 3, lines 38-49) to said substrate so as to increase the temperature of said region, said energy originating from an energy heat source (the water or the implicit heating device which heats it), said energy being applied so as to reduce the amplitude of voltage required in step b) to give raise to said current increase and/or to soften the material of said region [said effect is not explicitly referred to in D1, but it should occur, as understandable from the experiments of the present application].

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The subject-matter of claim 1 is distinguished therefrom in that

said step b) is performed using an electronic feedback mechanism operating according to user-predefined parameters, said electronic feedback mechanism controlling the properties of said applied voltage and/or said electrical properties [the claim does not specify which properties].

The subject-matter of claim 1 is therefore new (Art. 33(2)PCT).

A feedback control of the tension/current has following effects, according to the applicant:

- current and voltage driven melting/evaporation/removal of the substrate occurs in a controlled manner, diameter of the hole can be precisely defined;

Document US-6,348,675 discloses also a method of perforating plastic film by spark discharge, wherein the number of spark discharges is controlled by monitoring the pore-opening discharge spark and subsequent discharge sparks within one of the high voltage pulses by setting a threshold value. The pulse is cut off at a point when the desired number of penetrating spark discharges has been detected (col 3, lines 28-36). In this way pores of uniform diameter are produced. Therefore this document discloses a spark discharge provoking dielectric breakdown using an electronic mechanism, according to user-predefined parameters (in this case the threshold value S defined in D2, see col. 2, line 14). The length of the pulse can be considered as "a property of the applied voltage".

The question which is now posed is whether the skilled person would straightforwardly consider applying the teaching of D2 to D1.

D2 discloses that the electrodes (disks 60) press the film against the bottom of the tank, the strength of the gap between the electrodes is essentially that of film 4 (transition paragraph col.4-col.5). In D1 there is a length of a spark gap preferably between 2 and 30 mm and the film is not in contact with the electrodes. The film is not immersed in any fluid.

Since the conditions are very different, it would not be straightforward for the skilled person to combine the teaching of the two documents and the subject-matter of claim 1 involves

an inventive step (Art. 33(3) PCT). *It is noted that this conclusion is only valid in case step c) is initiated before step b), which is regarded as an essential feature, see §VIII.*

Claims 2-50 are dependent from claim 1 and therefore also meet the criteria of the PCT regarding novelty and inventive step.

Claim 51

D2 discloses a method of spark perforation of an electrically insulating substrate including steps a) and b) of claim 1. There is a feedback for controlling the length of the pulse and therefore a "property of the voltage." What exactly is "a small voltage" is not defined in the claim.

The subject-matter of claims 51 is therefore not new.

Claims 52-67

D1 discloses a device for forming a structure in a region of an electrically insulating substrate, comprising two electrodes (54,60) connected to a voltage supply (36). Furthermore it comprises means to apply energy, which are the electrodes themselves.

The subject-matter of independent claim 52 (*assuming that it is clarified, see §VIII, to include the feature that the voltage supply has means for feedback controlling the voltage by monitoring the transsubstrate current*), is distinguished therefrom by this feature and therefore new (Art. 33 (2) PCT). Furthermore it involves an inventive step (Art. 33(3)PCT), as the use of means for feedback controlling the voltage by monitoring the transsubstrate current in an apparatus for spark perforation results in more precision in the control of hole diameter and is not disclosed in any of the documents of the pertinent documentation.

The subject-matter of independent claim 53 is new and involves an inventive step for the same reasons.

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Claims 54-67 are dependent from claims 52 or 53 and therefore also meet the criteria of the PCT regarding novelty and inventive step.

The subject-matter of the application has industrial use.

Re Item VII

Certain defects in the international application

The features of the claims are not provided with reference signs placed in parentheses (Rule 6:2(b) PCT).

Independent claims (for a listing see §IV) are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (documents D2, D1) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor are these documents identified therein.

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

Claim 1 lacks the essential feature that ***step c) is initiated before step b)***, as otherwise the temperature of said region will not be increased.

Since independent claim 1 does not contain this feature it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the

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AUTHORITY (SEPARATE SHEET)

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invention.

Claim 51 is unclear because it references claim 1 and in claim 1 it is not clear whether the performance of step b) under a feedback control is actually part of step b). It is assumed in this examination that it is part of step b). Furthermore it is unclear because what a "small voltage is" is not defined in the claim.

Claim 52 is unclear because the expression "a voltage supply which can be controlled by a transsubstrate current" is vague. It should be clarified to state that ***the voltage supply has means for feedback controlling the voltage by monitoring the transsubstrate current.***